**2014 Rabies Summary**

**Massachusetts Department of Public Health**

The following summarizes data collected on animal specimens from Massachusetts sent to the William A. Hinton State Laboratory Institute (HSLI) for rabies testing from January to December 2014. Cumulative reports summarizing rabies testing from 1992-2002, and annual reports from 2003 to 2013 are available on the MDPH website and can be found at [www.mass.gov/dph/rabies](http://www.mass.gov/dph/rabies).

#### Number of Submissions and Positive Results by Year

The number and percentage of terrestrial animals that tested positive in 2014 was higher than that of the previous three years (see **Table 1 and Figure 1**). The number of bats that tested positive was higher than last year; but the percentage of bats testing positives remained similar.

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| **Table 1. Number of Submissions, Positive Results and Percent\* Positive by Year and Type of Animal** | | | | | | |
|  | **TERRESTRIAL ANIMALS** | | | **BATS** | | |
| **Year** | **Number Submitted** | **Number Positive** | **% Positive** | **Number Submitted** | **Number Positive** | **% Positive** |
| 1992 | 926 | 42 | 5% | 143 | 15 | 10% |
| 1993 | 3660 | 698 | 19% | 289 | 22 | 8% |
| 1994 | 4119 | 700 | 17% | 391 | 34 | 9% |
| 1995 | 3175 | 383 | 12% | 241 | 17 | 7% |
| 1996 | 2701 | 103 | 4% | 277 | 12 | 4% |
| 1997 | 2771 | 264 | 10% | 334 | 17 | 5% |
| 1998 | 3483 | 480 | 14% | 439 | 18 | 4% |
| 1999 | 2643 | 205 | 8% | 595 | 21 | 4% |
| 2000 | 2666 | 247 | 9% | 611 | 29 | 5% |
| 2001 | 2615 | 248 | 9% | 710 | 32 | 4% |
| 2002 | 2505 | 267 | 11% | 613 | 36 | 6% |
| 2003 | 2358 | 193 | 8% | 602 | 23 | 4% |
| 2004 | 2842 | 291 | 10% | 600 | 34 | 6% |
| 2005 | 2653 | 296 | 11% | 708 | 33 | 5% |
| 2006 | 2122 | 197 | 9% | 756 | 34 | 5% |
| 2007 | 1988 | 123 | 6% | 787 | 29 | 4% |
| 2008 | 2298 | 135 | 6% | 748 | 19 | 3% |
| 2009 | 1747 | 106 | 6% | 696 | 21 | 3% |
| 2010 | 1740 | 117 | 7% | 678 | 14 | 2% |
| 2011 | 1700 | 90 | 5% | 753 | 20 | 3% |
| 2012 | 1594 | 73 | 5% | 1196 | 38 | 3% |
| 2013 | 1644 | 79 | 5% | 1045 | 18 | 2% |
| **2014** | **1644** | **108** | **7%** | **1175** | **40** | **3%** |
| **Total** | **55,594** | **5,445** | **10%** | **14,387** | **576** | **4%** |

\* Calculated to nearest percent

**Notable Rabies Situations**

In 2014, 2,819 specimens were submitted to Hinton State Laboratory Institute (HSLI) for rabies testing. Of these specimens, 148 (5%) tested positive for rabies. **Table 2** shows data on positive animals for 2014. In 2014, four domestic animals tested positive; all were cats. Three of these cases illustrate why domestic animals with wounds of unknown origin must be treated as possible rabies exposures.

While visiting Pennsylvania (PA) a Middlesex County resident found a kitten and returned with it to Massachusetts (MA). The kitten was from a litter, all of which had wounds of unknown origin. Two weeks later, the kitten developed fever and ataxia, was euthanized and tested positive for rabies. Five MA adults who syringe-fed the kitten received post exposure prophylaxis (PEP). One dog in the home was placed under quarantine. The MA Department of Public Health (MDPH) worked with PA public health officials to identify the litter of kittens in PA and human exposures there.

In Worcester County, a feral cat was captured by the local animal inspector (AI) and brought for care for apparent broken hind legs. After surgery, the cat died. Because it bit a veterinary technician during treatment, it was submitted and tested positive for rabies. The technician and another with an open wound exposed to the cat’s saliva, received PEP. The local AI posted flyers in the area and one adult and one teenager were identified as exposed and both received PEP. The local health department issued a press release and the local AI collected additional stray cats that may have been exposed to the rabid cat.

A kitten found with a wound of unknown origin a month earlier was placed in a foster home in Essex County. Approximately a week after placement, the kitten developed symptoms of neurologic illness and was returned to the shelter. From there, it was taken to a veterinary clinic where it was euthanized. It was submitted and tested positive for rabies. The foster owner and two staff members at the veterinary clinic were bitten by the kitten and all received PEP. Four other cats in the foster home were placed under quarantine.

**Number of Submissions and Positive Results by Species**

Raccoons, skunks and foxes together, accounted for the large majority of rabies positive animals in Massachusetts (43%, 31% and 34% respectively), although the proportion of all rabies positive animals that they represent varied by quarter (**Figure 2**). Of note is that a slightly higher percentage of foxes (34%) tested positive than skunks (31%) in 2014.

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| **Table 2. Number of Animals Positive for Rabies/Animals Submitted (%\*), 2014** | | | | | | | | | | | | | | | |
|
|  | **1st Quarter** | | | **2nd Quarter** | | | **3rd Quarter** | | | **4th Quarter** | | | **Total** | | |
| Animal | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % | Number Positive | Number Submitted | % |
| Raccoon | 17 | 23 | 74% | 11 | 38 | 29% | 9 | 27 | 33% | 11 | 24 | 46% | 48 | 112 | 43% |
| Skunk | 6 | 15 | 40% | 5 | 13 | 38% | 14 | 68 | 21% | 14 | 29 | 48% | 39 | 125 | 31% |
| Cat | 0 | 170 | 0% | 3 | 164 | 2% | 1 | 215 | 0% | 0 | 181 | 0% | 4 | 730 | 1% |
| Fox | 0 | 3 | 0% | 3 | 10 | 30% | 5 | 11 | 45% | 2 | 5 | 40% | 10 | 29 | 34% |
| Woodchuck | 0 | 2 | 0% | 3 | 44 | 7% | 1 | 33 | 3% | 1 | 3 | 33% | 5 | 82 | 6% |
| Bat | 1 | 113 | 1% | 11 | 267 | 4% | 22 | 729 | 3% | 6 | 66 | 9% | 40 | 1175 | 3% |
| Cow | 0 | 1 | 0% | 0 | 1 | 0% | 0 | 0 | 0% | 0 | 1 | 0% | 0 | 3 | 0% |
| Coyote | 0 | 1 | 0% | 0 | 2 | 0% | 0 | 0 | 0% | 0 | 1 | 0% | 0 | 4 | 0% |
| Dog | 0 | 113 | 0% | 0 | 128 | 0% | 0 | 131 | 0% | 0 | 100 | 0% | 0 | 472 | 0% |
| Other\*\* | 1 | 18 | 6% | 1 | 31 | 0% | 0 | 16 | 0% | 0 | 22 | 0% | 2 | 87 | 1% |
| Total | 25 | 459 | 5% | 36 | 698 | 5% | 52 | 1230 | 4% | 34 | 432 | 8% | 148 | 2819 | 5% |

\* Calculated to nearest percent

\*\* Includes squirrels, rabbits, sheep, pigs, goats, horses, beaver, chipmunks, donkeys, bobcats, and opossums

**Figure 2. Proportion of All Positive Results Represented by Each Species, by Quarter, 2014**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Raccoon |  | Skunk |  | Cat |  | Fox |  | Woodchuck |  | Bat |
|  | Other |  |  |  |  |  |  |  |  |  |  |

**Cumulative Submissions and Results by Month**

Animal submission numbers fluctuated throughout the year. As expected, the highest number of submissions for both terrestrial animals and bats occurred during June, July and August (see **Table 3**). The lowest number of submissions occurred during the winter months of December, January, and February. This same trend is seen annually and is due to the greater activity of wildlife species during the spring and summer months, coinciding with the time that humans increase their outdoor activity level. These simultaneous events result in more frequent contact between humans and wildlife, and lead to more animal rabies testing.

The proportion of animals testing positive and unsatisfactory for rabies also varies throughout the year, generally showing a consistent pattern from year-to-year (see **Table 3 and Figure 3**). The change in the percent positive is normally small between years during the same month and significant departures from this seasonal pattern can be used to detect alterations in the intensity of virus circulation in an area. Of note, the percent of both terrestrial animals and bats that tested positive in September and October increased significantly between 2013 and 2014. The percent of unsatisfactory bats in September and October increased from 10% and 0% in 2013 to 27% and 13% in 2014.

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| **Table 3. Submissions, Number Positive and Unsatisfactory for Rabies, and Percent\* Positive and Unsatisfactory**  **by Month and Animal Type: 2013 and 2014** | | | | | | | | | | | | | | | | | | | | |
|
|  | **TERRESTRIAL ANIMALS** | | | | | | | |  |  | **BATS** | | | | | | | | | |
| **Month** | **Submitted 2013** | **Positive 2013** | | **Unsatisfactory 2013** | | **Submitted 2014** | **Positive 2014** | | **Unsatisfactory 2014** | | **Submitted 2013** | **Positive 2013** | | **Unsatisfactory 2013** | | **Submitted 2014** | **Positive 2014** | | **Unsatisfactory 2014** | |
| January | 97 | 4 | 4% | 0 | 0% | 123 | 9 | 7% | 0 | 0% | 32 | 1 | 3% | 3 | 9% | 45 | 0 | 0% | 3 | 7% |
| February | 111 | 7 | 6% | 2 | 2% | 93 | 7 | 8% | 1 | 1% | 21 | 0 | 0% | 2 | 10% | 29 | 0 | 0% | 1 | 3% |
| March | 103 | 7 | 7% | 3 | 3% | 130 | 8 | 6% | 4 | 3% | 42 | 0 | 0% | 2 | 5% | 39 | 1 | 3% | 4 | 10% |
| April | 128 | 6 | 5% | 1 | 1% | 129 | 11 | 9% | 4 | 3% | 39 | 0 | 0% | 7 | 18% | 43 | 1 | 2% | 7 | 16% |
| May | 146 | 6 | 4% | 7 | 5% | 149 | 11 | 7% | 4 | 3% | 33 | 0 | 0% | 3 | 9% | 61 | 4 | 7% | 4 | 7% |
| June | 172 | 8 | 5% | 8 | 5% | 153 | 4 | 3% | 7 | 5% | 111 | 2 | 2% | 2 | 2% | 163 | 6 | 4% | 14 | 9% |
| July | 173 | 4 | 2% | 12 | 7% | 182 | 6 | 3% | 7 | 4% | 149 | 3 | 2% | 18 | 12% | 192 | 3 | 2% | 15 | 8% |
| August | 201 | 12 | 6% | 10 | 5% | 182 | 13 | 7% | 7 | 4% | 508 | 8 | 2% | 56 | 11% | 493 | 14 | 3% | 50 | 10% |
| September | 160 | 6 | 4% | 7 | 4% | 137 | 11 | 8% | 5 | 4% | 41 | 3 | 7% | 4 | 10% | 44 | 5 | 11% | 12 | 27% |
| October | 129 | 7 | 5% | 2 | 2% | 150 | 16 | 11% | 2 | 1% | 13 | 1 | 8% | 0 | 0% | 24 | 4 | 17% | 3 | 13% |
| November | 123 | 9 | 7% | 2 | 2% | 104 | 4 | 4% | 2 | 2% | 24 | 0 | 0% | 2 | 8% | 24 | 2 | 8% | 1 | 4% |
| December | 101 | 3 | 3% | 3 | 3% | 112 | 8 | 7% | 4 | 4% | 32 | 0 | 0% | 3 | 9% | 18 | 0 | 0% | 2 | 11% |
| **TOTAL** | 1644 | 79 | 5% | 57 | 3% | 1644 | 108 | 7% | 47 | 3% | 1045 | 18 | 3% | 102 | 10% | 1175 | 40 | 3% | 116 | 10% |

\* Calculated to nearest percent

The distribution of positive and unsatisfactory rabies results varies throughout the year and by animal type (terrestrial versus bats) (**Figure 3**). In every quarter, more terrestrial animals test positive for rabies than are unsatisfactory for testing. In contrast, the number of bats testing positive each quarter was less than the number determined to be unsatisfactory for testing. Over the course of the year, twice as many terrestrial animals were positive than were unsatisfactory while there were three times as many unsatisfactory bats as there were positive ones.

**Submissions and Positive Results by County**

In 2014, all counties in Massachusetts expect Nantucket submitted at least one animal for rabies testing, and all counties, except Dukes, had at least one animal that tested positive (see **Table 4 and Figure 4**). Middlesex, Worcester, and Norfolk counties submitted the highest number of animals (n = 611, n = 328, n = 386, respectively). Worcester and Middlesex County had the highest number of animals that tested positive (n = 30, n=30) and Hampshire County had the highest percentage of submitted animals that tested positive (9%).

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| **Table 4. Rabies Testing Data by County- Number of Animals Positive for Rabies/Number of Animals Submitted (%)** | | | | | |
| **County** | **1st Quarter** | **2nd Quarter** | **3rd Quarter** | **4th Quarter** | **Cumulative** |
| Barnstable | 0/17 (-- %) | 0/27 (-- %) | 0/38 (-- %) | 0/14 (-- %) | 0/96 (-- %) |
| Berkshire | 1/14 (7%) | 1/18 (6%) | 2/32 (6%) | 2/11 (18%) | 6/84 (7%) |
| Bristol | 0/23 (-- %) | 1/53 (2%) | 1/73 (1%) | 1/23 (4%) | 3/172 (2%) |
| Dukes | 0/1 (-- %) | 0/1 (-- %) | 0/3 (-- %) | 0/2 (-- %) | 0/7 (-- %) |
| Essex | 2/51 (4%) | 2/76 (3%) | 7/134 (5%) | 8/67 (12%) | 19/328 (6%) |
| Franklin | 1/11 (9%) | 1/15 (7%) | 0/24 (-- %) | 2/10 (20%) | 4/60 (7%) |
| Hampden | 5/33 (15%) | 3/37 (8%) | 3/69 (4%) | 1/23 (4%) | 12/162 (7%) |
| Hampshire | 0/13 (-- %) | 0/8 (-- %) | 3/37 (8%) | 3/7 (43%) | 6/65 (9%) |
| Middlesex | 5/101 (5%) | 10/152 (7%) | 9/276 (3%) | 6/82 (7%) | 30/611 (5%) |
| Nantucket | 0/0 (-- %) | 0/0 (-- %) | 0/0 (-- %) | 0/0 (-- %) | 0/0 (-- %) |
| Norfolk | 4/65 (6%) | 2/94 (2%) | 7/171 (4%) | 5/56 (9%) | 18/386 (5%) |
| Plymouth | 2/37 (5%) | 3/54 (6%) | 2/85 (2%) | 4/34 (12%) | 11/210 (5%) |
| Suffolk | 0/39 (-- %) | 5/63 (8%) | 4/118 (3%) | 0/36 (-- %) | 9/256 (4%) |
| Worcester | 5/54 (9%) | 9/100 (9%) | 14 /170 (8%) | 2/67 (3%) | 30/391 (8%) |

**Mapping**

MDPH maps rabies-positive terrestrial animals on an annual basis (see **Figure 5**).

**Figure 5.**

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